

**M72 SERIES POLARIZING MICROSCOPE**

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**VICKERS INSTRUMENTS LTD.**



## M72 SERIES

### POLARIZING MICROSCOPES

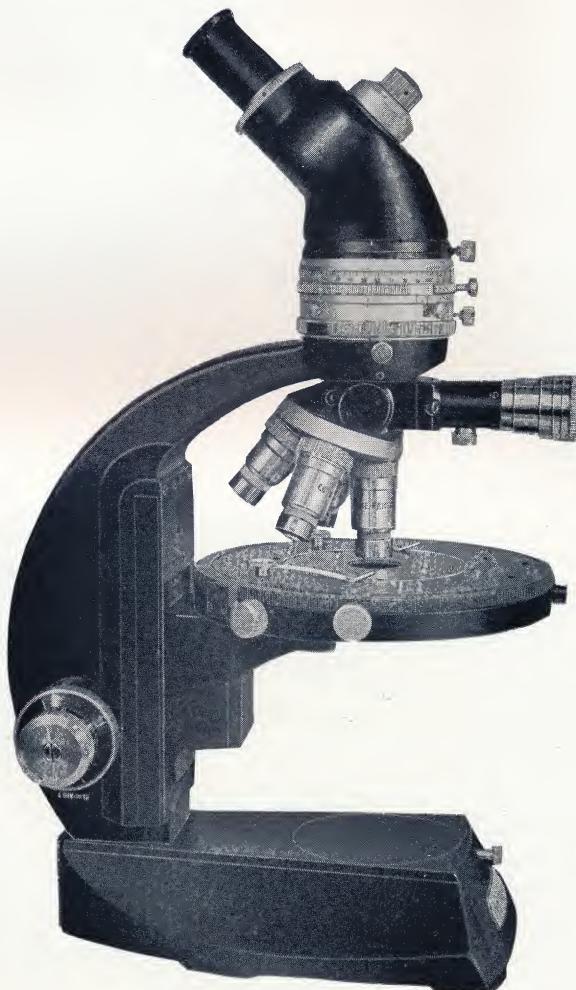
**three basic instruments  
from a basic stand**

The M72 series microscopes have the same limb, base and stage. They form, however, a range of three microscopes, one for transmitted light, one for incident light, and one for transmitted and incident light; each is available in two forms: either with a revolving objective changer, or with a fitting to allow the objective to be mounted on to the microscope in individual centring changers.



**M72 for transmitted light illustrated with:**

M720225 Monocular head   M720100 Analyser unit  
M720190 Polarizer unit   M220290 Illuminator



**M73 for incident light illustrated with:**

M720225 Monocular head  
M720100 Analyser unit

## three basic stands . . .

Stand **M72** is for transmitted polarizing work. The basic microscope contains all the standard features of the polarizing range of instruments and includes a rack and pinion focusing substage which can be fitted with either of the polarizers shown on page 6. Any of the viewing heads or analysers can be attached.

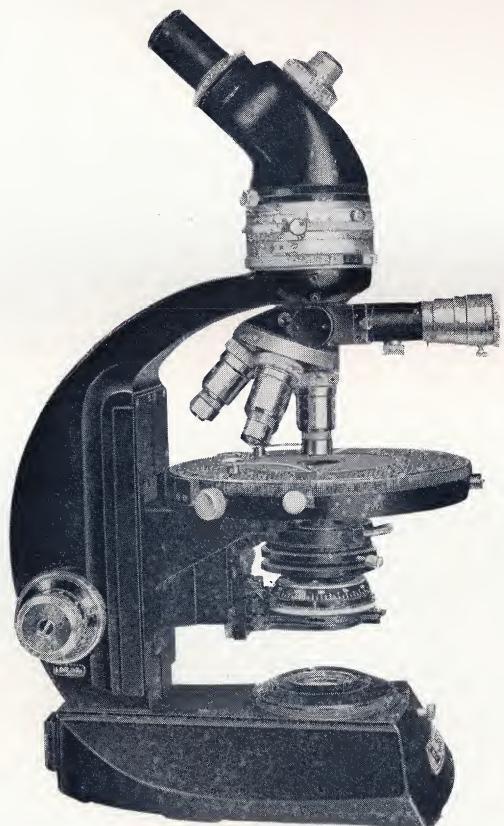
**M72004** Stand with triple objective changer and simple polarizer.  
**M720024** Stand with individual objective changer and simple polarizer.  
**M720005** Stand with triple objective changer and advanced polarizer.  
**M720025** Stand with individual objective changer and advanced polarizer.

Stand **M73** is for incident polarized light work. It has no substage but has the incident illuminator built on. It can be fitted with any of the viewing heads and analysers.

**M730005** Stand with quadruple objective changer.  
**M730025** Stand with attachment for individual objective changers.

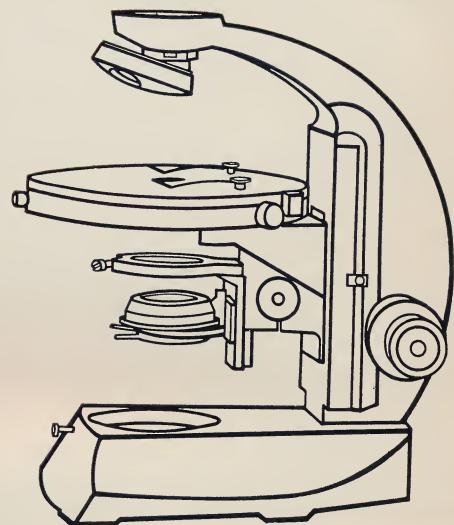
Stand **M74** is for incident and transmitted polarized light work. It has the rack and pinion substage, the incident illuminator, and the advanced polarizer. It can be fitted with all the available attachments and accessories.

**M740005** Stand with quadruple objective changer.  
**M740025** Stand with attachment for individual objective changers.

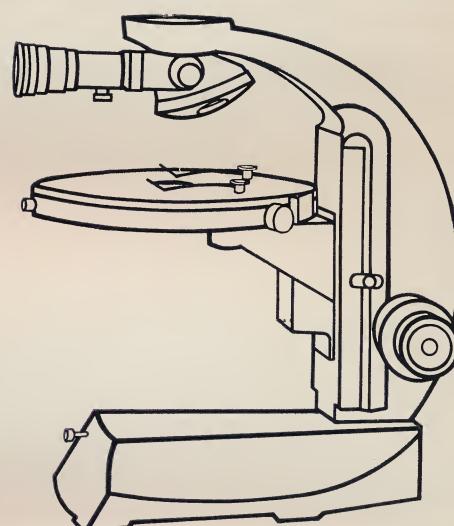


**M74** for incident and transmitted light illustrated with:

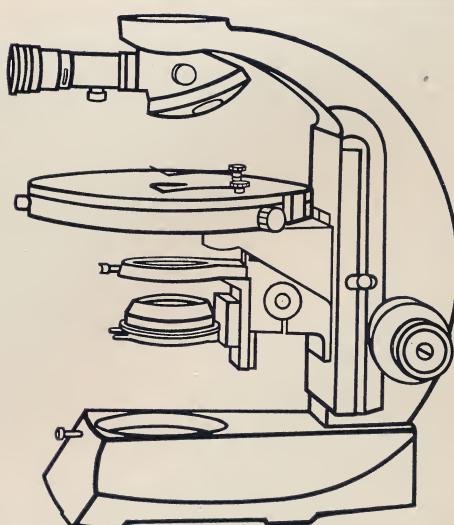
M720225 Monocular head   M720190 Polarizer unit  
M720100 Analyser unit   M220290 Illuminator



**M72**



**M73**



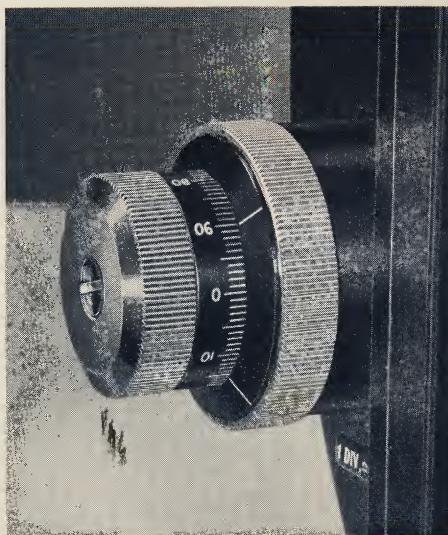
**M74**



## SPECIAL FEATURES

### VICKERS POLARIZING MICROSCOPES

the basic stand and attachments have many new and advanced design features



#### COARSE AND FINE FOCUSING

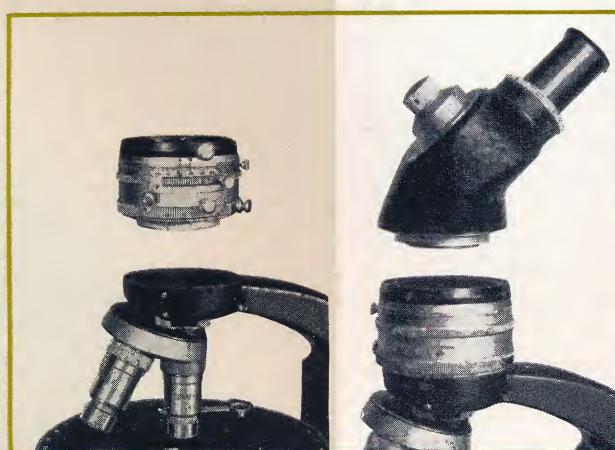
Concentric coarse and fine focusing control knobs are low placed to give a comfortable working position and the very wide ball bearing focusing slides ensure excellent rigidity. Fine adjustment graduated every 2 microns.



#### ROTATING STAGE

The optical precision rotating stage is a novel Vickers Instruments design in which the ball tracks are produced by the same method used in the making of lenses, thereby achieving similar precision. This gives a stage with great accuracy of rotation and a very free movement. Two verniers are fitted, reading to 6 minutes of arc. The stage has centring screws and a lock to the rotation. The centre disc removes for the three axis stage to be fitted.

An attachable mechanical stage, M720300, is available for fitting to the rotating stage.



#### HEADS AND ANALYSER UNITS

Monocular or binocular heads are easily attached or removed. The range of heads and analyser units which are available, is shown on page 6.



### MONOCULAR HEADS

The Bertrand lens is in the monocular head. Rotation of the knob swings the lens in or out and a stop is incorporated to isolate the conoscopic figure from small particles.

An alternative monocular head has a focusing Bertrand lens. The lens is swung in or out by rotation of the larger knob and focused by the smaller concentric knob.

Details of the following publications are available from Vickers Instruments:

"MANUAL OF THE POLARIZING MICROSCOPE" by A. F. Hallimond, M.A., Sc.D.

"NEW BRITISH POLARIZING MICROSCOPE" by A. F. Hallimond, M.A., Sc.D. and B. O. Payne, M.Sc.

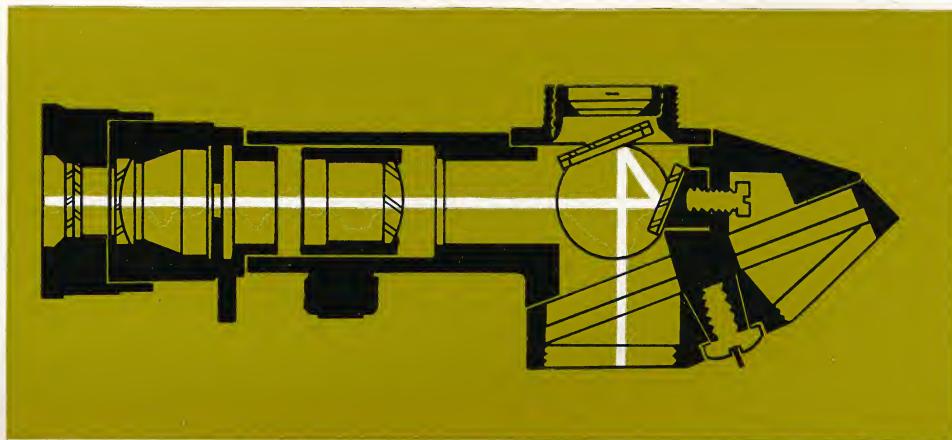
"CRYSTAL OPTICS" by C. E. Marshall, D.Sc., Ph.D.

"MICROSCOPE DESIGN & CONSTRUCTION" by B. O. Payne, M.Sc.

### INCIDENT ILLUMINATOR

The incident illuminator\* is a considerable advance on earlier designs. The light entering the illuminator is reflected by a mirror so that it falls on to the thin glass reflector at a much reduced angle, thus minimising the rotation effects on reflection. The result is a more uniformly polarized field and aperture than is commonly obtained in incident polarized light microscopy.

\* Provisional Patent No. 44100/61.



### ANALYSER UNIT

The more advanced analyser has the unusual feature that the analyser can be rotated together with the compensator slot, or each can be rotated separately, which allows great flexibility in the use of compensators. All polarizing elements used in Vickers Instruments polarizing microscopes employ top grade high extinction polarizing film, mounted between specially selected plates of strain free optical glass and edge-sealed against moisture.



# ACCESSORIES

## VICKERS POLARIZING MICROSCOPES

### HEADS

The following viewing heads are available. M720227 for normal tube eyepiece and M720228 for wide tube eyepiece, are monocular heads having a swing-out non-focusing Bertrand lens. M720225 for normal tube eyepiece and M720226 for wide tube eyepiece, are monocular heads having a focusing swing-out Bertrand lens. M720270 is a binocular head for normal tube eyepieces. M720380 is a photovisual head with swing-out non-focusing Bertrand lens in which the light can be directed up the 30° viewing tube, or vertically through to a camera by withdrawing the Bertrand lens and reflecting prism from the light path, the tube length and magnification remaining unchanged.

### INDIVIDUAL OBJECTIVE CHANGERS

Instead of revolving objective changers the microscope can be supplied with individual objective changers. A receiving unit is attached to the microscope and each objective is screwed permanently into an individual changer which has centring screws to bring the objectives exactly parcentral with each other. The objectives, on their individual changers, can then be clipped on to the microscope. The changer is shown fitted to the incident illuminator and reflector unit.

### ANALYSER UNITS

The simple Analyser M720135 has a non-rotating pull-out analyser and a 45° slot for compensators.

The advanced Analyser M720100 has a rotating pull-out analyser, the rotational position of which can be read by vernier to 6 minutes of arc, and clamped. It also has a rotating compensator slot, the position of which can be read to 6 minutes of arc and clamped. If required the two can be clamped and rotated together, a feature which can be useful for some compensating techniques.

### POLARIZER UNITS

Two polarizer units are available. M720170 has a simple swing-out polarizer which rotates through 90° and is ungraduated. M720190 has a swing-out polarizer graduated every 5° with a click stop every 90°. Both polarizing units have a subsidiary lens in a trip-out mount for use with low power objectives, and also a swing-out filter holder and ground glass screen.

### ILLUMINATION

The transmitted light microscopes can be illuminated by a plano and concave mirror in a gymbal, M220325, or by the high intensity light M220290. This has a 6 v. 15 w. lamp in the microscope base, a lens and diffusing screen. It is fed from a transformer with dimming rheostat.

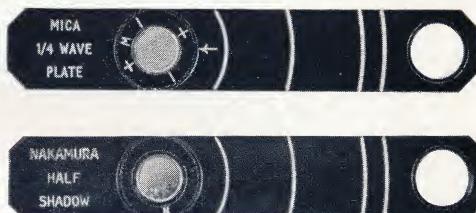
## DICK-WRIGHT OCULAR

The graduated rotating slotted ocular, M007570, which can be used with the photovisual head M720380, has been designed to enable the top portion containing the analyser, cross-wires, and slot for compensators, to be rotated with a circular scale graduated in degrees against a fixed vernier reading to 6 minutes of arc. It is fitted with a clamp and iris diaphragm. Selenium cell adaptor for photometric measurements is available on order.



## COMPENSATORS

- M720335** Mica  $\frac{1}{4}$  wave plate.
- M720340** Nakamura  $\frac{1}{2}$  shadow plate.
- M720345** Elliptic  $\frac{1}{20}$  wave plate.
- M720350**  $\frac{1}{4}$  wave and sensitive tint plate in single mount.
- M720365** de-Sénarmont plate (5461A).
- M720370** Elliptic and Nakamura plate in single mount.
- M720375** Sensitive tint plate.
- M007585** Quartz wedge—not graduated, 6 orders.
- M007590** Quartz wedge—graduated, 6 orders.
- M007572** Adaptor for any of the above compensators to Dick-Wright ocular.
- M007571** Wide graduated quartz wedge—6 orders for Dick-Wright ocular.



## ACHROMATIC OBJECTIVES

The range of achromatic objectives for polarizing microscopes extends from  $3\times$  to  $100\times$  oil immersion. They are all mounted with great care and then selected for strain-free properties. The lower powers up to  $10\times$  can be used for transmitted or incident light work, but from  $20\times$  upwards objectives must be corrected for use with or without a cover glass over the specimen, and if work with both covered and uncovered objects is to be done, two of each of the higher power objectives will be necessary, one for covered objects and one for uncovered objects.

Flat field achromatic objectives are available in powers  $10\times$ ,  $20\times$  and  $40\times$ .



## EYEPieces

Eyepieces for polarized light microscopes have a cross-line in the field of view and a focusing adjustment to focus the crossline. The eyepieces are either normal tube 23.2 mm. diameter or the wide tube wide field type 29.2 mm. diameter. Monocular heads are made in both normal and wide tube. The binocular head is only made in the 23.2 mm. tube.

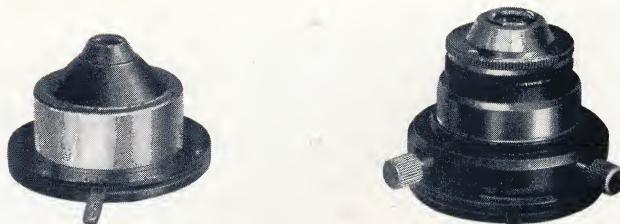


## CONDENSER

The Abbe condenser M720294 is usually favoured for polarizing microscopes as its simple construction provides a minimum of depolarizing problems. It is supplied in a plain mount.

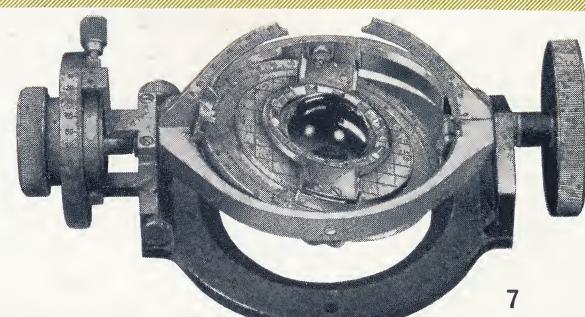
The swing-out top lens condenser M720495 is of the Abbe type and is supplied in a centring mount.

The aplanatic condenser M720475 in a centring mount is useful where a higher numerical aperture is required.



## THREE AXIS UNIVERSAL STAGE

The three axis universal stage M007745 is for the determination of the optical properties of crystals. The equipment includes a special  $5\times$  objective N.A. 0.15 (N.A. 0.23 when the hemispheres are used) and a pair of glass hemispheres ( $n=1.54$ ). A complete range of accessories is available.



## When ordering a polarizing microscope...

1. Choose the stand .....



2. The analyser .....



3. The viewing head .....



4. The polarizing unit .....



5. The mirror or illumination unit .....



6. Eyepieces .....



7. Objectives .....



8. Condenser .....



See page 6 and enclosed price list for accessories.

### EYEPieces

#### NORMAL TUBE

M045000 5×  
M045300 10×  
M045320 10× paired

#### WIDE TUBE

M045005 5×  
M045305 10×  
M045303 10× (with scale)

### ACHROMATIC OBJECTIVES

#### POWER N.A.

M022013	3×	.10
M022113	5×	.15
M022313	10×	.25
M022413	20×	.5
M022414	*20×	.5
M022513	40×	.65
M022514	*40×	.65
M022913	40×	.85
M022914	*40×	.85
M022613	100×	1.30

#### FLAT FIELD OBJECTIVES

M025113	10×	.25
M025114	*10×	.25
M025413	20×	.5
M025414	*20×	.5
M025213	40×	.7
M025214	*40×	.7

\* for uncovered objects.

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**VICKERS** *Excellence... in*  
**Polarizing Microscopes**

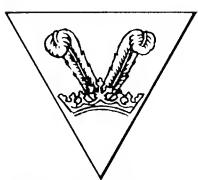
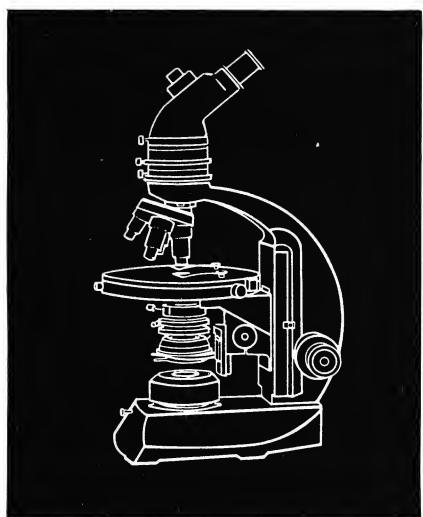
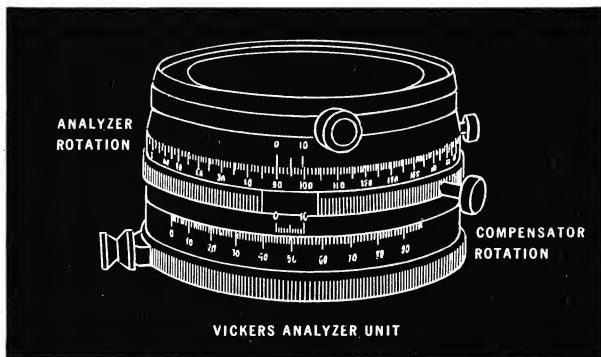
gives you significant new performance advantages in chemical, mineralogical or petrographic studies. Here are a few particular examples:

**ANALYSIS OF POLARIZED LIGHT** — no other polarizing microscope gives you facilities as complete as those designed into the Vickers for the quantitative analysis of polarized light. The swing-out polarizer is graduated and rotatable through 360°. The analyzer unit is rotatable through 180°.

Compensators may be rotated through 90° and provision is made for rotation either independently or linked with analyzer rotation to a precision of 0.1°. With this facility you can, for example rotate a simple mica compensator below the analyzer, eliminating the necessity for an expensive insertable "elliptic compensator". ▼ Compensators and graduated wedges may be inserted and read either in the analyzer unit, or just above the objective back lens (where graduations on a quartz wedge can be read over the interference figure) or, by using the Wright slotted ocular, above the Bertrand Lens. In this position compensators can be used equally well on the specimen image or its interference figure. In a few words, the Vickers design enables the most precise and convenient execution of all analyses, from the simplest to the most sophisticated. ▼

**MICROSCOPE STAGE** — the new ball-bearing stage is built to a new standard of smooth, easy motion, stability and precision operation. This is achieved by a unique manufacturing method involving preparation of the ball-race bearing surfaces by optical lens working techniques.

**FLAT FIELD PERFORMANCE** — the Microplan flat field objectives can be supplied strain-free in magnifications of 10x, 20x and 40x. This is the widest available range of strain-free, specially corrected objectives, giving you wide, absolutely flat fields of view from 50x to 700x. ▼ These examples are only examples — there is so much more which deserves your consideration, — other optical and mechanical design features, the wide range of models for research and routine applications, the unequalled selection of special accessory equipment. Our catalog tells the whole story. May we send it to you?



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## POLARIZING MICROSCOPE

MAY 1966

### STANDS

Polarizing microscope for transmitted light, with limb, base, concentric coarse and fine focusing, ball bearing rotating stage, rack and pinion substage, revolving triple objective changer, and simple polarizer

		Price	Number Required	Total
	<b>M720004</b> <input type="checkbox"/>	\$ 488.50		
Polarizing microscope for transmitted light as above, but with individual objective changer	<b>M720024</b> <input type="checkbox"/>	476.00		
As M720004 but with graduated polarizer	<b>M720005</b> <input type="checkbox"/>	530.00		
As M720024 but with graduated polarizer	<b>M720025</b> <input type="checkbox"/>	517.00		
Polarizing microscope for incident light, with limb, base, concentric coarse and fine focusing, ball bearing rotating stage, external source incident illuminator, and revolving quadruple objective changer	<b>M730005</b> <input type="checkbox"/>	517.50		
*Extra cost for illuminator M730150 in place of external source incident illuminator	<input type="checkbox"/>	79.50		
Polarizing microscope for incident light as above, but with individual objective changer	<b>M730025</b> <input type="checkbox"/>	512.00		
*Extra cost for illuminator M730150 in place of external source incident illuminator	<input type="checkbox"/>	79.50		
Polarizing microscope for transmitted and incident light, with base, limb, concentric coarse and fine focusing, ball bearing rotating stage, rack and pinion substage, graduated polarizer, external source incident illuminator, revolving quadruple objective changer	<b>M740005</b> <input type="checkbox"/>	644.00		
*Extra cost for illuminator M730150 in place of external source incident illuminator	<input type="checkbox"/>	79.50		
Polarizing microscope for transmitted and incident light as above, but with individual objective changer	<b>M740025</b> <input type="checkbox"/>	638.50		
*Extra cost for illuminator M730150 in place of external source incident illuminator	<input type="checkbox"/>	79.50		
<b>VIEWING HEADS</b>				
(at least one of the viewing heads must be ordered with each stand)				
Straight monocular head with focusing Bertrand lens for normal tube eyepieces	<b>M720410</b> <input type="checkbox"/>	123.00		
<i>*A built-in light incident illuminator, M730150, is offered in lieu of the external source incident illuminator included in the above incident light stands. When this is required the cost of the stand (M730005, M730025, M740005 or M740025) will be increased by <del>79.50</del> 79.50</i>				

*\*A built-in light incident illuminator, M730150, is offered in lieu of the external source incident illuminator included in the above incident light stands. When this is required the cost of the stand (M730005, M730025, M740005 or M740025) will be increased by ~~79.50~~ 79.50*

		Price	Number Required	Total
<b>ILLUMINATION UNITS</b>				
One of the substage illumination units must be ordered with each stand for transmitted light				
Plano-concave mirror in gimbal for microscope with circular recess in base	<input type="checkbox"/> M220325	\$ 20.25		
Plano-concave mirror in gimbal for microscope with circular and extended recess in base	<input type="checkbox"/> M151391	18.50		
Low voltage illuminator with 6 V., 15 W., bulb for microscope with circular recess in base	<input type="checkbox"/> M220290	48.75		
Low voltage illuminator with 6 V., 15 W., bulb for microscope with circular and extended recess in base	<input type="checkbox"/> M720615	50.00		
Transformer for 110 V. mains with dimming rheostat for M220290 illuminator	<input type="checkbox"/> M220501	36.00		
High intensity bench lamp complete with built-in transformer for 110 V. supply with 6 V., 48 W. bulb	<input type="checkbox"/> M012804	137.75		
Spare bulb 6 V., 48 W.	<input type="checkbox"/> M012801	5.25		
Spare bulb 6 V., 15 W.	<input type="checkbox"/> M150521	5.25		
<b>OBJECTIVES</b>				
(All the objectives listed below are strain free)				
	Magnification	N.A.		
<b>Achromatic</b>				
3 $\times$	0.10	<input type="checkbox"/> M022013	18.00	
5 $\times$	0.15	<input type="checkbox"/> M022113	35.25	
10 $\times$	0.25	<input type="checkbox"/> M022313	27.50	
20 $\times$	0.5	<input type="checkbox"/> M022413	50.00	
*20 $\times$	0.5	<input type="checkbox"/> M022414	51.50	
40 $\times$	0.65	<input type="checkbox"/> M022513	43.75	
*40 $\times$	0.65	<input type="checkbox"/> M022514	46.00	
40 $\times$	0.85	<input type="checkbox"/> M022913	60.50	
*40 $\times$	0.85	<input type="checkbox"/> M022914	63.50	
100 $\times$ oil	1.30	<input type="checkbox"/> M022613	69.00	
<b>Microplan</b>				
10 $\times$	0.25	<input type="checkbox"/> M025113	57.25	
*10 $\times$	0.25	<input type="checkbox"/> M025114	58.25	
20 $\times$	0.50	<input type="checkbox"/> M025413	89.50	
*20 $\times$	0.50	<input type="checkbox"/> M025414	91.50	
40 $\times$	0.70	<input type="checkbox"/> M025213	65.50	
*40 $\times$	0.70	<input type="checkbox"/> M025214	67.75	
*—For uncovered objects.				
Centring objective mount for single objective changer (where a single objective changer has been ordered on the stand one of these mounts is needed for each objective ordered)	<input type="checkbox"/> M007716	20.75		

EYEPieces			Price	Number Required	Total
<b>Huygens with crossline</b>					
5×	Single (normal tube)	<b>M045000</b> <input type="checkbox"/>	\$ 36.00		
5×	Single (wide tube)	<b>M045005</b> <input type="checkbox"/>	36.00		
10×	Single (normal tube)	<b>M045300</b> <input type="checkbox"/>	24.75		
10×	Single (wide tube)	<b>M045305</b> <input type="checkbox"/>	38.25		
10×	Paired (normal tube)	<b>M045320</b> <input type="checkbox"/>	51.00		
10×	Single (wide tube with scale)	<b>M045303</b> <input type="checkbox"/>	52.75		
Old No.					
Dick-Wright graduated rotating slotted ocular		<b>M007570</b> <input type="checkbox"/>	201.65		
Accessories for Dick-Wright ocular:—					
Extra wide quartz wedge, 6 orders		<b>M007571</b> <input type="checkbox"/>	74.00		
Adaptor to permit use of standard compensators		<b>M007572</b> <input type="checkbox"/>	11.75		
Adaptor with circular opening to carry grati-cules		<b>M007574</b> <input type="checkbox"/>	6.75		
(The Dick-Wright graduated rotating slotted ocular can only be fitted to the following heads, M720380, M720410, M720411, M720412 and M720413)					
<b>CONDENSERS</b>					
Centring trip-out condenser with aspheric lens		<b>M720496</b> <input type="checkbox"/>	61.50		
Abbe condenser in plain mount 1.2 N.A.		<b>M720294</b> <input type="checkbox"/>	24.75		
Swing out top lens condenser in plain mount		<b>M720290</b> <input type="checkbox"/>	44.75		
Swing out top lens condenser in centring mount		<b>M720495</b> <input type="checkbox"/>	59.00		
Aplanatic condenser in plain mount, 1.0 N.A.		<b>M720361</b> <input type="checkbox"/>	44.25		
Aplanatic condenser in centring mount, 1.0 N.A.		<b>M720362</b> <input type="checkbox"/>	73.50		
Aplanatic condenser in plain mount for built-in illuminator, 1.0 N.A.		<b>M720363</b> <input type="checkbox"/>	57.75		
Aplanatic condenser in centring mount for built-in illuminator, 1.0 N.A.		<b>M720364</b> <input type="checkbox"/>	87.50		
Aplanatic condenser in centring mount, 1.3 N.A.		<b>M720475</b> <input type="checkbox"/>	80.00		
Aplanatic condenser in plain mount, 1.3 N.A.		<b>M720476</b> <input type="checkbox"/>	52.00		
Achromatic oil immersion condenser in centring mount, 1.3 N.A.		<b>M720359</b> <input type="checkbox"/>	119.50		
<b>ACCESSORIES</b>					
Attachable mechanical stage for fitting to rotating stage		<b>M720300</b> <input type="checkbox"/>	163.50		
Three axis universal stage with 5× objective N.A. .15, a pair of hemispheres, all supplied in case		<b>M007745</b> <input type="checkbox"/>	944.00		
Accessories for three axis stage:					
Additional pair of hemispheres, n = 1.62		<b>M007752</b> <input type="checkbox"/>	53.75		
Additional pair of hemispheres, n = 1.70		<b>M007753</b> <input type="checkbox"/>	53.75		
Interchangeable central plate which can be heated by water circulation, and a special lower hemisphere for use therewith (n = 1.54)		<b>M007754</b> <input type="checkbox"/>	80.75		
Additional lower hemisphere for M007754, n = 1.62		<b>M007755</b> <input type="checkbox"/>	22.50		

		Price	Number Required	Total
Additional lower hemisphere for M007754, n = 1.70	<b>M007756</b> <input type="checkbox"/>	\$ 22.50		
Iris unit for inserting above objective	<b>M007757</b> <input type="checkbox"/>	26.75		
Stereographic net, 20 cm. diameter, on wood base, arranged for rotation under tracing paper	<b>M007758</b> <input type="checkbox"/>	39.75		
As M007758 but printed on separate paper sheet	<b>M007772</b> <input type="checkbox"/>	.25		
Equal area net, 20 cm. diameter, printed on paper	<b>M007773</b> <input type="checkbox"/>	.25		
Extra for alternative bridge for upper hemisphere, incorporating a parallel guide, suitably graduated	<b>M007765</b> <input type="checkbox"/>	110.75		
3 $\times$ objective, N.A. 0.1 (0.15 with hemispheres)	<b>M022013</b> <input type="checkbox"/>	18.00		
20 $\times$ objective, N.A. 0.25 (0.38 with hemispheres)	<b>M007817</b> <input type="checkbox"/>	181.00		
Point or particle counter	<b>M007530</b> <input type="checkbox"/>	663.25		
Counter unit alone, for use as a particle counter	<b>M007531</b> <input type="checkbox"/>	403.25		
Visual microphotometer complete with 6 V., 6 W. lamp and transformer (for use with normal eyepiece tube)	<b>M007550</b> <input type="checkbox"/>	374.00		
Visual microphotometer as above, but for use with wide eyepiece tube	<b>M007551</b> <input type="checkbox"/>	392.00		
Spare bulb, photometric 6 V., 6 W., for microphotometer	<b>M606456</b> <input type="checkbox"/>	1.75		
Stage micrometer, glass, 1 mm. divided into 100 parts	<b>M001586</b> <input type="checkbox"/>	22.50		
As M001586 but scale ruled on metal	<b>M001591</b> <input type="checkbox"/>	31.50		
Filar micrometer, with 10 $\times$ eyepiece, travelling web reading against a mm. scale reading direct to 0.01 mm., for normal tube eyepieces	<b>M011525</b> <input type="checkbox"/>	151.25		
As M011525 but for wide tube eyepieces	<b>M011526</b> <input type="checkbox"/>	151.25		
Fitted wood cabinet for microscope	<b>M720525</b> <input type="checkbox"/>	47.00		